

[Time:3 Hrs]

[ Marks:75 ]

- N.B: 1. 1. Q.1 is compulsory and carries 20 Marks.  
 2. Q.8 is compulsory and carries 15 Marks.  
 3. Attempt any Four questions from Q.2 to Q.7. Each of these questions carry 10 Marks.  
 4. Figures to the right indicate full marks.  
 5. Use of simple calculator is permitted.

Q.1	A)	Select the correct option for the following statements/questions:	(10)
	i)	Two samples A and B have the same standard deviation but the mean of A is greater than that of B the coefficient of variation of A is a) Greater than that of B      b) Less than that of B c) Equal to that of B      d) None of these	
	ii)	A card is drawn at random from a well-shuffled pack of cards. What is the probability that the card drawn is a diamond? a) $1/3$ b) $1/13$ c) $2/13$ d) $1/4$	
	iii)	In a negative skewed distribution, order of mean, median and mode is as a) mean < median > mode.      b) mean > median > mode. c) mean < median < mode.      d) mean > median < mode.	
	iv)	If x and y are independent then coefficient of correlation between x and y is a) $r = 1$ b) $r = -1$ c) $r = 0$ d) $r \neq 0$	
	v)	If m is the mean of Poisson distribution, then $P(X=0)$ is given by a) $e^m$ b) $e^{-m}$ c) $e$ d) $m^e$	
	vi)	Using a goodness-of-fit test, we can assess whether a set of obtained frequencies differ from a set of _____ frequencies a) Mean      b) Actual      c) Predicted      d) Expected	
	vii)	When conducting an ANOVA, FDATA will always fall within what range? a) between 0 to $\infty$ b) between $-\infty$ to $\infty$ c) between -1 to 1      d) between $-\infty$ to 0	
	viii)	Normal Distribution is symmetric is about _____	

		a) Variance	b) Mean	c) Standard deviation	d) Covariance			
	ix)	If the values of regression coefficient are 0.2 and 0.8, then the values of correlation coefficient is _____						
		a) 0.6	b) -0.6	c) 0.36	d) 0.4			
	x)	The sampling error is defined as?						
		a) difference between population and parameter						
		b) difference between sample and parameter						
		c) difference between population and sample						
		d) difference between parameter and sample						
Q.1	B)	State whether the statement is True or False.					(10)	
	i)	Correlation coefficient is not affected by change of scale and origin.						
	ii)	A conditional probability exists when the probability of one event is dependent on another.						
	iii)	The numerical value of a standard deviation can never be positive.						
	iv)	Mean are not capable of further algebraic treatment.						
	v)	If Mean < Median < Mode than it represents a positive skewed distribution.						
	vi)	All values of data are identical than mode does not exist.						
	vii)	Discrete random variable takes only isolated values.						
	viii)	Sampling error increases as we increase the sampling size.						
	ix)	For the estimation of $x$ for the given value of $y$ , we use regression line of $y$ on $x$ .						
	x)	The T-test is a reliable.						
Q.2		Attempt any Two of the following:					(10)	
	A)	Calculate the mode using the graphical method for the following distribution of data:						
		Sales in units	10-20	20-30	30-40	40-50	50-60	60-70

		No. of Days	24	30	45	30	20	15	
B)	Find the 65 <sup>th</sup> percentile in the following data:								
	Profit	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60		
	Firms	4	16	20	10	7	3		
C)	The average daily wage paid to 150 workers in a factory was Rs. 340. The average daily wage of 90 male workers was Rs. 360. What was the average daily wage of the remaining female workers?								
<b>Q.3</b>	<b>Attempt any Two of the following:</b>								<b>(10)</b>
A)	Calculate the standard deviation of the following data:								
	Size of Shoes	5	6	7	8	9			
	No. of pairs	12	17	35	26	10			
B)	Find the Bowley's coefficient of Skewness for the following distribution:								
	X	1	3	5	7	9	11		
	F	3	8	14	20	19	7		
C)	Calculate the mean deviation from mean for the following data: 8, 7, 12, 13, 10, 14, 16, 4, 6.								
<b>Q.4</b>	<b>Attempt any Two of the following:</b>								<b>(10)</b>
A)	If A and B are two events of sample space S, such that $P(A) = 0.85$ , $P(B) = 0.7$ and $P(A \cup B) = 0.95$ . Find i) $P(A \cap B)$ , ii) $P(A B)$ , iii) $P(B A)$ ..								
B)	Pay-offs of three acts X, Y and Z and states of nature $S_1$ , $S_2$ , $S_3$ are given below:  Pay-off in ('000' Rs.)								
	State of nature	Course of Action							
		X	Y	Z					
	$S_1$	-80	-50	10					
	$S_2$	120	150	100					
	$S_3$	300	280	350					
	The probabilities of the states of nature are 0.3, 0.2 and 0.5. Calculate the EMV and EOL for the data given and select the best act. Also find the expected value of perfect information (EVPI).								
C)	If the probability is 0.45 that a program development job; 0.8 that a networking job applicant has a graduate degree and 0.35 that applied for both. Find the probability that applied for atleast one of jobs. If number of graduate are 500 then how many are not applied for jobs?								

Q.5		Attempt any Two of the following:				(10)		
	A)	Suppose on an average 1 house in 1000 in a certain district has a fire during a year. If there are 2000 houses in that district, what is the probability that exactly 5 houses will have a fire during the year? [given that $e^{-2} = 0.13534$ ]						
	B)	Eight coins are tossed simultaneously. Find the probability of getting atleast six heads.						
	C)	In a sample of 5000 cases, the mean of certain test is 14 and standard deviation is 3. Assuming the distribution to be normal, How many candidates score between 5 to 20?						
Q.6		Attempt any Two of the following:				(10)		
	A)	The mean life of the tyres manufactured by a company follows normal distribution with standard deviation 3200 kms. A sample of 250 tyres is taken and it is found that the average life of the tyres is 50000 kms with a standard deviation of 3500 kms. Establish the 99% confidence interval within which the mean life of tyres of the company is expected to lie.						
	B)	In experiments on pea breeding the following frequencies of seeds were obtained:						
		Round and yellow	Wrinkled and yellow	Round and green	Wrinkled and green	Total		
		315	101	108	32	556		
		Theory predicate that the frequencies should be in proportions 9:3:3:1. Examine the correspondence between theory and experiment.						
	C)	A teacher claims that the mean score of students in his class is greater than 82 with a standard deviation of 20. If a sample of 81 students was selected with a mean score of 90 then check if there is enough evidence to support this claim at a 0.05 significance level.						
Q.7		Attempt any Two of the following:				(10)		
	A)	Calculate the Karl Pearson's coefficient of correlation for the following data and comment:						
		X	10	8	11	7	9	12
		Y	8	5	10	6	7	11
	B)	The following information is provided regarding the regression equation of y on x: The equation is $5x - 2y - 21 = 0$ , $\bar{x} = 9$ , the coefficient of correlation is 0.8. Find the mean value of y and the ratio of the standard deviations of x and y.						
	C)	Suppose it is known that 47% of Indian own smart phone. If a random sample of 50 Indians were surveyed, what is the probability that the proportion of the sample who owned smart phone is between 50% and 54%?						
Q.8		Attempt any Three of the following:				(10)		
	A)	The following data gives the ranks of 10 students in two consecutive years 1990 and 1991						

		1990	2	4	1	7	3	9	6	10	8	5	
		1991	3	2	1	5	6	7	8	9	10	4	
		Find the rank correlation coefficient.											
	B)	A manufacturer claims that 10% of his product is defective. A sample of 300 items selected at random had 32 defective items. Test his claim at 1% level of significance.											
	C)	A random variable $X$ has probability mass function as follow:											
		$X = x_i$	-1	0	1	2	3						
		$P(x_i)$	K	0.2	0.3	2k	2k						
		Find the value of k, and expected value and variance.											
	D)	Write the Advantages of simple random sampling.											
		*****											